
STATE OF INDIANA

DEPARTMENT OF LOCAL GOVERNMENT FINANCE



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Attachment A
LaPorte County Ratio Study
Mann-Whitney/ Spearman Rank Test Results
Revised 2006 pay 2007

December 4, 2008

Summary

- The revised 2006 pay 2007 LaPorte ratio study fails the Mann-Whitney test.
 - The problems of greatest severity, which must be corrected, are as follows:
 - Nineteen percent (19%) of tested neighborhoods, accounting for 14% of total assessed value, demonstrated significant horizontal inequity (“sales chasing”) as indicated by the Mann-Whitney test.
 - A large percentage of sales (56%) in the revised ratio study were not included in the original ratio study; these must be verified by the county as appropriate sales to include, and the reason for their prior exclusion made clear.
 - Additional problems which merit correction, but are not required for resubmission purposes if the county provides a reasonable explanation of these issues, are as follows:
 - A large number of sold parcels (404 out of 3563, or 11%) were not listed in the submitted workbook.
 - A large percentage of neighborhoods (185 out of 360, or 51%) contained fewer than five (5) sold parcels, and could not be tested for sales chasing.
 - Vacant residential in two townships demonstrated significant vertical inequity, meaning that high and low-value parcels were not assessed the same.

Introduction

On November 20, 2008, the vendor Nexus Group submitted a revised ratio study and workbook for LaPorte County on behalf of the County Assessor. The ratio study documents the re-trending of LaPorte County ordered by the Department of Local Government Finance in May 2008.

This report outlines the Department’s findings with regards to the uniformity and equitability of the revised ratio study and is divided into four sections. The first section compares the number

and similarity of parcels used in the prior and revised ratio studies. It is shown that 56% of the sold parcels used in the revised study were not used in the prior study. These parcels are concentrated in Center, Coolspring, and Michigan townships; their inclusion in this revision must be explained to the Department's satisfaction.

The second section analyzes the revised ratio study neighborhoods for horizontal equity. It is shown that 19% of the neighborhoods tested demonstrate statistically significant levels of horizontal inequity. These neighborhoods are concentrated in Center, Coolspring, Galena, and Michigan. Horizontal inequity in these four townships must be corrected prior to ratio study approval.

The third section details additional concerns with the revised ratio study. These are (1) numerous sales used in the ratio study missing from the workbook; (2) a large number of neighborhoods have fewer than five (5) parcels; and (3) significant vertical inequity in two strata.

The final section outlines steps which the LaPorte County Assessor must take prior to approval of this ratio study. In particular, the Assessor must (1) correct the horizontal inequity in all flagged neighborhoods in Center, Coolspring, Galena, and Michigan townships; and (2) explain the addition of new parcels added to Center, Coolspring, and Michigan townships, and why parcels used in the prior ratio study in these townships were removed.

Number and Similarity of Parcels

The initial ratio study comprised 3,796 total parcels and 3,493 total sales. The discrepancy between parcels and sales exists because (1) some sales included multiple parcels; and (2) some parcels sold multiple times. The number of unique parcels is 3,629, leaving 167 duplicates.

By comparison, the post-assessment ratio study comprised 3,736 total parcels and 3,417 total sales. As before, the discrepancy exists because of multiple parcel sales and parcels which were included multiple times. The number of unique parcels is 3,563. Inspection shows that the total number of sales used in the revised ratio study is similar to that used in the initial ratio study.

A deeper level of analysis looks at whether the *same* sales were used in both ratio studies. A computer matching algorithm determined the number of sales common to both ratio studies. This algorithm compared every sold parcel utilized in the previous ratio study with every sold parcel utilized in the current ratio study. Matches were recorded, and a list of matching and non-matching parcels was generated; duplicate parcels were removed prior to matching.

This algorithm determined that only 1,562 of the sales used in the initial ratio study are also used in the revised ratio study. In other words, out of the 3,563 unique sales in the current ratio study, 2,002, or 56%, were not used in the initial ratio study. Also, because the total number of parcels is similar in both ratio studies, a significant number of sales used in the prior ratio study were not used in the revised study. Table 1 reports the number of newly added sales by township.

Table 1: Number of Newly Added Sales in Revised Study, by Township

Township	New Sales
Cass	13
Center	430
Clinton	22
Coolspring	175
Dewey	17
Galena	28
Hanna	21
Hudson	45
Kankakee	72
Lincoln	74
Michigan	434
New Durham	86
Noble	34
Pleasant	67
Scipio	62
Springfield	55
Union	33
Washington	30
Wills	25

The highlighted rows display the three townships where a substantial number of sales not included in the prior ratio study were added: Center, Coolspring, and Michigan. Together, these three townships account for over half (52%) of the newly added sales. These three townships are also three of the four townships with many neighborhoods failing the Mann-Whitney test. The reason for adding this many sales to these three townships must be made clear to the Department before the ratio study can be approved.

Horizontal Equity

To test for horizontal equity, the percent change of assessed value from 2005 – 2006 was compared between sold and unsold properties in LaPorte County. This comparison was performed by neighborhood, with all neighborhoods containing five (5) or more sold parcels being tested. Prior to testing, all parcels whose property class had changed from 2005 to 2006 were excluded from analysis.

The Wilcoxon Mann-Whitney test was used to determine whether significant differences existed between the percentage changes of sold versus unsold parcels. The null hypothesis in all cases was that the percent change of sold parcels was not different than the percent change of unsold

parcels. This means that the Department assumes no sales chasing exists in any neighborhood unless proven otherwise.

The Mann-Whitney test details how confident the Department is that sales chasing exists in each neighborhood. In this case, the Department had to be 95% confident that sales chasing had taken place before ordering corrective action. A statistician would say that rejecting the null hypothesis for any neighborhood indicates at least 95% confidence that the difference in the percent change of sold and unsold parcels is statistically significant.

Out of 175 neighborhoods tested, the Department is at least 95% confident that sales chasing has occurred for 34 (19%) of them. These neighborhoods, their corresponding townships, and the actual level of confidence determined by the Mann-Whitney test are reported in Table 2. For neighborhoods not listed, the Department is not 95% confident that sales chasing has taken place.

Table 2: Mann-Whitney Results by Neighborhood

Township	Neighborhood	Confidence Level
Center	9509	99.5%
Center	9424	99.0%
Center	9511	97.1%
Center	9540	98.1%
Center	9409	99.9%
Center	9501	99.4%
Center	9535	99.7%
Clinton	98132	99.9%
Coolspring	115262	99.5%
Coolspring	135509	99.7%
Coolspring	115401	99.8%
Coolspring	135505	99.9%
Coolspring	1150011	99.5%
Coolspring	115121	98.6%
Coolspring	135301	98.1%
Coolspring	115002	99.3%
Dewey	1851	99.3%
Galena	20174	99.8%
Galena	2652	99.9%
Galena	2056	96.6%
Hanna	24122	99.9%
Hudson	2652	99.9%
Hudson	26122	99.9%
Kankakee	33495	99.9%
Lincoln	3651	99.5%

Michigan	420514	98.3%
Michigan	420504	99.4%
Michigan	420501	95.4%
Michigan	429205	99.8%
Michigan	420527	98.2%
Michigan	450521	96.7%
New Durham	4952	99.9%
Pleasant	561102	96.4%
Scipio	621132	99.5%
Union	7551	99.4%

The 34 neighborhoods that did not pass the Mann-Whitney test comprise 14% of the total assessed value of LaPorte County. This is a significant amount of assessed value, which would have a serious impact on the equity of assessments and the fair distribution of the burden of taxation if left uncorrected. Table 3 shows the percent of total assessed value contained in neighborhoods which failed the Mann-Whitney test for each township.

Table 3: Percent of Total AV, by Township

Township	Pct. Of Total AV
Center	2.12%
Clinton	0.4%
Coolspring	2.68%
Dewey	0.21%
Galena	1.93%
Hanna	0.29%
Hudson	0.26%
Kankakee	0.33%
Lincoln	0.42%
Michigan	3.66%
New Durham	0.04%
Pleasant	0.53%
Scipio	0.51%
Union	0.35%

As can be seen, 10% of this assessed value is concentrated in residential improved parcels in four specific townships: Center, Coolspring, Galena, and Michigan. Note that Center, Coolspring, and Michigan contained over half of the newly added sales, as reported above. The Department urges the county to focus their Mann-Whitney correction efforts on these four townships.

Additional Concerns

Three additional problems with the ratio study deserve mention. First, the workbook submitted by the county must contain every parcel in the county. However, a computer matching algorithm determined that, out of 3563 unique sales in the revised ratio study, 402 (11%) were not included in the workbook. This casts doubt on the workbook as a snapshot of the county as a whole.

Second, a majority of neighborhoods (185 out of 360, or 51%) could not be tested for horizontal equity, as they contained four (4) or fewer parcels. This may mean the county has been over-stratified, which is poor assessment practice. Finally, two strata—Hanna and Pleasant residential vacant—did not pass the Spearman-Rank correlation test for vertical equity.

Conclusion and Recommended Corrections

This report has analyzed the 2006 pay 2007 LaPorte County ratio study submitted by the vendor Nexus Group on behalf of the LaPorte County Assessor. The following conclusions were noted:

- Significant levels of horizontal inequity as determined by the Mann-Whitney test, concentrated in Center, Coolspring, Galena, and Michigan townships.
- A large number of newly added sales, concentrated in Center, Coolspring, and Michigan townships.
- Additional concerns regarding the legitimacy of the workbook; neighborhood stratification; and vertical inequity in two strata.

Based on these conclusions, the following corrections must be made to the ratio study before it can be approved.

- Horizontal inequity must be corrected in all listed neighborhoods in Center, Coolspring, Galena, and Michigan townships. These neighborhoods will be analyzed using the Mann-Whitney test, and all must pass.
- An explanation must be submitted detailing (1) why so many new sales were added to Center, Coolspring, and Michigan townships, and (2) why sales used in these three townships in the prior ratio study were not used in the revised study. This explanation must be approved by the Department of Local Government Finance.

The Department also urges that the following actions be undertaken, but they are not required for ratio study approval if the county provides a reasonable explanation of these issues. This explanation must be approved by the Department of Local Government Finance.

- Ensuring that every sale in the ratio study is listed in the workbook.
- Correcting the over-stratification so a reasonable number of neighborhoods contain four (4) or more parcels.
- Correcting the vertical inequity in the Hanna and Pleasant residential vacant strata.